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ESTATE TAMIL LABOUR STATISTICS (F.M.S.) IN 1912.

BY E. MACFADYEN.

The following table is compiled from the figures relating to Estate Tamil labour forces in the F. M. S. which accompany the Controller of Labour's Annual Report for 1912:—

	Selangor	Perak	Negri Sem- bilan	Pahang	F.M.S.
Recruited during 1912 ...	38,868	18,358	7,833	414	65,473
Engaged locally ...	12,350	19,663	2,748	343	35,104
Employed on Jan. 1st 1912 ...	59,185	38,903	11,718	636	110,442
	110,404	76,924	22,299	1,393	211,019
Died during the year ...	2 214	1,411	1,333	47	5,005
Deserted „ ...	14,915	11,719	3,633	349	30,616
Discharged „ ...	24,949	20,517	5,449	354	51,269
	42,078	33,647	10,415	750	86,890
Balance on 31st Dec., 1912 ...	68,325	43,277	11,884	643	124,129
Average estate population ...	59,396	41,090	11 688	600	112,774
Death rate ...	3.72%	3.43%	11.40%	7.83%	4.43%

The total Tamil population of the F. M. S. at December 31st is estimated to be 210,000; so that working estate coolies constitute a fraction less than 60% of the whole Tamil population.

The above table indicates that taking the country as a whole planters lost from one cause or another during the year numbers equal to 78.67% of the labour forces they began the year with.

They recruited from India numbers equal to 59.29% of their initial force; and engaged locally numbers equal to 31.78%.

After deducting losses from gains the nett result was a gain on balance of 12.40%.

The above table may be rearranged as follows, in terms of percentages (to the nearest unit) on the forces employed on January 1st:

		F.M.S.	Selangor.	Perak.	N. S'tan.	Pahang.
Additions	...	91	86	97	90	119
Losses	...	79	71	86	89	118
Nett gain	...	12	15	11	1	1

The additions, expressed in the same terms, consist of:—

		F.M.S.	Selangor.	Perak.	N. S'tan.	Pahang.
Coast recruits	...	59	65	47	67	65
Local	„ ...	32	21	50	23	54

The losses, expressed in the same terms, consist of:—

		F.M.S.	Selangor.	Perak.	N. S'tan.	Pahang.
Discharges	...	47	43	53	47	56
Desertions	...	28	25	30	31	55
Deaths	...	4	3	3	11	7

The gain by recruiting from India exceeded the mean for the four States in all except Perak; desertions exceeded the mean in all except Selangor, and were practically double the mean in the case of Pahang. Perak was the only State in which local engagements exceeded desertions.

Incidentally one may note that some error appears to have crept in to the Selangor figures as printed; since column 6 of the table in appendix F is not equal to the totals of columns 10 and 11.

THE NEW COCONUT CULTIVATION ENACTMENT IN KEDAH.

A copy of the Coconut Cultivation Enactment 1331 has recently been received from the British Adviser to the Government of Kedah. This enactment has been passed for the purpose of encouraging the cultivation of coconuts by small proprietors in

mukims that are either outside the padi planting area or are especially adapted to the cultivation of coconuts. For this purpose, according to the terms of the Enactment, any person who is cultivating, in any of the mukims enumerated in the schedule of the Enactment, land of which the area does not exceed 20 relongs ($26\frac{2}{3}$ acres) and in respect of which he has paid land-tax or land-rent for the past year, may, on planting not less than 30 coconuts obtain remission of land-tax or land-rent in respect of one relong of his land for three years. Further, he can obtain remission of land-tax for the same period on an additional half relong of land for every 15 trees planted. It should be noted that no one is allowed to take up new land under this Enactment. He must first take up the land in the usual course and plant it with coconuts and then he can apply for remission of the land-tax in accordance with the number of trees planted.

In order to obtain the remission authorised the owner of the land planted in coconuts must report to the penghulu within six months from the date of planting. The penghulu himself, or his deputy, is then required to visit the land, inspect it and count the number of trees upon it which in his opinion are not more than six months old. After this he is to issue a certificate to the owner, who has to take it to the Land Officer of the District. The latter is empowered to act on the Penghulu's certificate without further enquiry and to issue to the owner a second certificate exempting him from land tax or land rent in respect of that area of his land which contains coconut trees at the rate of 30 to the relong, no area being included in addition to the first relong that is less than $\frac{1}{2}$ relong in extent.

When the Land Officer's certificate covers all the land owned by the proprietor the latter is exempt from attendance at the Land Office until the fourth year; when only part is so covered the proprietor is required to pay land tax or land rent upon the residue not planted in coconuts or not containing them at the specified rate.

If a man plants coconuts on part of his land only in the first year and obtains remission of the land tax or land rent for that year, and then plants a further portion of his land in the second year he can obtain a second certificate from the penghulu in respect of the second portion which entitles him to remission of land tax or land rent in respect to that portion for a further period of three years.

The Director of Lands is required to send land-rangers to inspect lands for which the special privileges of this Enactment

have been granted, and the same officer must on a report from the Land Officer send land-rangers to make enquiries if a penghulu is suspected of neglecting his duties or of not acting in accordance with the provisions of the Enactment. Thus a certain amount of supervision is provided.

In order to explain further this Enactment the "Objects and Reasons" for it are here quoted:—

"The object of this Enactment is to encourage the planting of coconuts by small proprietors in certain mukims outside the padi-planting area. It is sought to do this by remitting, wholly or partially, the land-rent or land-tax for 3 years on such holdings, not exceeding 20 ~~relongs~~ relongs in area as are wholly or partially, brought under coconut cultivation. The mukims to which the Enactment applies are set forth in a schedule. All the mukims in Langkawi Island (which is particularly adapted to coconut plantation) are included, the interior mukims of Kubang Pasu, every mukim in Padang Trap, the interior mukims of Kota Star, every mukim in Baling, and a few special mukims, mostly in the interior in Kuala Muda, Kulim and Krian. With the exception of a few specially suitable mukims such as Yen, Singkir and Merbok, no mukim on the coast, which is the padi area *par excellance*, is included. It is considered desirable to make the procedure for obtaining exemption as simple as possible. Any elaborate procedure, hedged in on all sides with safe guards, will choke off any intending cultivator. And so the Government takes a certain amount of risk, and grants exemption upon a certificate by the penghulu.

"Only 30 trees to the relong are required to be planted. This is a very small number and allows the trees to be planted more than 30 feet apart. But it must be remembered that there are probably other trees already growing on the land, and that there are also buildings, etc. (Trees planted 25 feet apart are 50 to the relong.) Thus it works out that as soon as a man has planted 30 young plants, he obtains a remission amounting to \$1.50 (50 cents per relong per annum for 3 years) equivalent to 5 cents per plant.

"This amounts to the Government providing the coconuts gratis. To grant exemption for longer than 3 years upon a penghulu's certificate would, it is thought, be asking too much. And, on the other hand, any complicated system by which the trees would be re-counted at any interval would only lead to bickerings and discontent."

INTERNATIONAL RUBBER AND ALLIED INDUSTRIES EXHIBITION LONDON, 1914.

The following competitions in connection with the above Exhibition are notified:—

THE PRESIDENT'S TROPHY.

Sir Henry A. Blake, G. C. M. G., has intimated that he will present a Trophy for the exhibit proving the greatest interest in connection with the preparation, production, or use of rubber in any form.

RUBBER GROWERS' ASSOCIATION COMPETITIONS.

Competition I. Medals will be given for the best commercial samples of plantation rubber exhibited in the following classes: Class 1.—Crepe. Class 2.—Smoked Sheet. Class 3.—Assorted Invoice, embracing No. 1 rubber and scrap grades. Entries close May 1, 1914.

Competition II. A gold medal will be given for the best exhibit connected with plantation rubber, grown in the Middle East. No entry will be necessary.

Competition III. A prize of £50 and a gold medal will be given to what is adjudged the most valuable improvement connected with the collection or preparation of plantation rubber (open only to Managers or Assistants on Estates), such improvement to have been introduced between July 1, 1913, and March 31, 1914, on which latter date entries close.

Competitions IV and V are for manufacturers.

Competition VI. A prize of £50 and a gold medal is offered for the discovery and application of such new use for plantation rubber as may be adjudged the most valuable.

INDIA RUBBER JOURNAL COMPETITIONS.

Ideal Rubber Estate Factory. The proprietors of the *India Rubber Journal* offer a prize of £25 for the best plan of and essay on a rubber estate factory.

Estate Photograph Competition. A prize of £25 is also offered for the best collection of photographs illustrating all departments of rubber estate work, from seed collection to shipping of rubber. Entries close May 12, 1914.

THE RUBBER WORLD TROPHIES.

A silver cup, value £20, will be awarded by the *Rubber World* for the Essay judged to be the most practical, useful, and comprehensive on the subject: What is an Ideal Rubber Estate? The

idea of the competition is not literary but practical and competitors must be or have been planters or assistants. A silver salver will be given for the second best essay.

GRENIER'S RUBBER NEWS COMPETITION.

A silver trophy, value £50, will be given for the best and one, value £15, for the second best samples of Commercial rubber taken from bulk shipment, and grown in Malaya, Borneo, Java, Sumatra or Indo-China.

TROPICAL LIFE COMPETITIONS.

Gold medals are offered for Ceara Rubber, Sisal Hemp, Coconut Fibre, Robusta Coffee, Copra, Hand and Power Spraying Machines.

NEW IDEAS FOR THE USE OF PLANTATION RUBBER.

A first prize of 75 guineas, and a second one of 25 guineas are offered by the Mincing Lane Tea and Rubber Share Brokers' Association for some new ideas in the carrying out of which plantation rubber may be commercially used on a large scale.

Other competitions are limited to special localities (outside Malaya), while the President offers a trophy for Cotton and prizes are also given for wild rubber.

AFRICAN OIL PALM IN MALAYA.

BY F. G. SPRING.

During the past year the Department of Agriculture has received many inquiries with regard to the cultivation of this palm and it is hoped that the present article will, to some extent, help planters and others who are interested in the subject.

The African Oil Palm has long been grown in this country but only as an ornamental plant. It has been in the Botanic Gardens, Singapore since 1895, whilst in Kuala Lumpur and several other towns in the Federated Malay States there are many trees 10 year old and upwards; it is to be seen in a number of private grounds. It is only recently, however, that its financial aspect has been considered.

The palm is indigenous to West Africa but is abundant almost all over tropical Africa. It has been distributed all over the world and is to be found growing luxuriantly in most tropical countries. It is found in greatest abundance from Sierra Leone to the Cameroons where it occurs in dense forests practically inexhaustable and according to authorities as yet almost unworked.

"The commercial supplies of palm oil are obtained mainly from Southern Nigeria, Sierra Leone, the Gold Coast Colony, the Cameroons, Dahomey, the French Congo, Togoland and Angola but in recent years there have been exports of palm kernels from many other countries." (Bulletin of the Imperial Institute 1909, Vol. VII, No. 4.)

DESCRIPTION OF THE TREE.

"The full grown oil palm may attain a height of about sixty feet, and consists of a stem covered throughout its length with the bases of dead leaves, and bearing at the apex a crown of large, pinnate leaves, each of which may be fifteen feet in length. The fruits are borne in large bunches termed "heads" or "hands", which are small and numerous when the tree first begins to bear but decrease in number and increase in size in the next few years; as many as thirty "heads" may be formed at first, decreasing to anything between two and twelve as the tree ages. The fruits are usually from one to one and a half inches in length, and three quarters to one inch in diameter and are roughly egg-shaped. The fruits are reddish brown or orange in tint. The fruit is botanically a drupe and consists of three well marked portions. Outside is a layer varying in thickness and composed of a soft fibrous pulp, carrying from fifty-five to sixty-five per cent. of an orange-coloured, semi-solid fat, which when extracted constitutes the palm oil of commerce. Inside this pulp is the palm nut, consisting of a hard woody shell, which may vary considerably in thickness, enclosing usually a single palm kernel, though sometimes two or even three are present; the kernel is the second useful product of the palm fruit; it is dark reddish brown or almost black externally, and internally consists of a rather hard, white "flesh" loaded with oil, which when extracted constitutes the "Palm-Kernel oil" of commerce. The tree is very slow growing, and it is estimated that it attains its full height of sixty feet in about one hundred and twenty years." (Bulletin of the Imperial Institute, 1909, Vol. VII, No. 4.)

CULTIVATION.

The Oil palm is propagated from seed, only seed from eight to ten year old trees and upwards should be used for planting purposes as those from young trees are extremely small and in all probability would not give as good results as seed from mature trees.

The nursery beds should be raised, made of fairly rich humus soil and near a water-course if possible to ensure the proper humid-

ity of the soil. The seed should be planted about eighteen inches apart each way at a depth of from one to one and a half inches. The seed is said to take from four to five weeks to germinate but I find in this country they may take as long as three months. The beds require to be artificially shaded and in dry weather regularly watered. When the seedlings are a foot high they may be transplanted into their permanent quarters which should be about 25 feet apart. Holing similar to that of planting rubber is greatly beneficial.

The tree would appear from its distribution in Malaya to thrive on most soils but a rich humus fairly damp but well drained would in all probability give the best results. Judging from reports the rainfall is an important factor but Malaya is well adapted in that respect.

In West Africa it would appear that the palm is cultivated only to a small extent and then in a rather primitive manner, the natives depend entirely on wild forests for their supply of palm fruits. It is a question whether a well managed plantation in this country where good rail and transport facilities will be financially as successful as collecting fruits from the African forests.

Palm Oil cultivation would lend itself well to a catch crop such as coffee as the palms give little shade until they are from six to eight year old, and then probably not too dense to interfere with the growth of catch crops.

YIELD OF FRUIT, ETC.

The following is taken from the Kew Bulletin of Miscellaneous Information, No. 4, 1909.

"The age at which seedling oil palms come into bearing varies slightly in different places, and appears to depend mainly on the situation in which they are planted.

"The fruits take from two to six months to mature, according to the season of the year at which the inflorescences are formed. In the Gold Coast, according to Evans, the young plants commence to yield their first crop of fruits when about five years old when grown on the rich alluvial lands, but not until the sixth or seventh year in the hilly country, and gradually to increase their yield for 60 to 80 years.

"According to some informants the palms commence bearing in their sixth year, and bear only two or three bunches of fruit, the fruits being small. During the next five years the number of bunches increases from 4 to 6 per year, and in the twelfth year the palm yields its full harvest. Freyburger, quoted by Gruner, states that the bunches of fruit do not become more numerous as

the palm grows older, but that both the bunches and the individual fruits increase in size. A young palm, six years old, according to him, bears 1 to 6 small bunches of fruit, whilst one of 10 to 20 years of age has only 1 to 6 very large bunches with well developed fruits.

"Thomson gives the following particulars as to the growth and yield of the Oil palm from the Western Province of Southern Nigeria.

"On rich newly cleared forest soil, the oil palm is said to bear its first bunches of nuts when it is seven to eight years old. The first bunches are small, about the size of a man's fist, and from eight to thirty of them are formed on the plant annually. As the latter gets older, the bunches increase in size, and number only between four and twelve. When the palm is fully grown, that is at about the age of from eight to ten years the bunches of nuts reach their maximum size, and are developed at the rate of from two to twelve per tree per annum. This rate of yield is continued afterwards practically throughout the natural life of the palm.

"The limits between which the yield varies in the case of full grown trees are given below:—

- (a) Full grown trees yield from about two to twelve bunches of nuts annually, each bunch weighing from 20 to 56 lbs. according to size.
- (b) An average-sized bunch contains at least 200 nuts, and the weight of the latter varies from 7 to 21 lbs.
- (c) The annual yield in oil of a tree is at least $7\frac{1}{2}$ lbs. in weight."

The Bulletin of the Imperial Institute referred to previously states that in the ordinary variety of Palm Fruits from the Cameroons the pulp contains 60.3 per cent of palm oil while the kernels contain 48.9 per cent of palm kernel oil, in an average sized head of fruit.

In Kuala Lumpur Gardens the number of "bunches" to a tree and the number of nuts to a "bunch" compare favourably with the figures quoted; in one bunch there were over 400 nuts. The trees in the Experimental Plantation, Kuala Lumpur, commenced fruiting in the fifth year and produced fair sized bunches with well developed fruits.

CONCLUSION.

The Palm Oil industry would appear to be handicapped in West Africa by transport difficulties and lack of machinery. This industry is practically in the hands of natives and as long as it re-

mains so it is unlikely that machinery will be used to any extent on account of the cost.

Transport and machinery are two very important factors and if the Oil Palm is ever grown to any extent in Malaya it would be greatly advantageous to have oil factories at one or two stations where all plantations could send their fruits. This would avoid the installation of expensive machinery on individual estates, and small plantations where machinery is out of the question and would save a large sum on the transport of nuts.

THE PHILOSOPHY OF PIPING AS A PREVENTIVE OF PALUDISM.

BY C. STRICKLAND, M. A., B. C., CANTAB:

Travelling Medical Entomologist, Federated Malay States.

The subject of this paper—subsoil drainage as an anti-malarial measure—is scarcely a purely agricultural one, but on the other hand it touches so closely the interests of the planting community that perhaps no excuse need be offered for its appearance in a Journal devoted to the Science of Agriculture.

With regard to this subject we are it seems come to a time when it would be well to wash the slate clean to write something new on it, to clean-weed some ground and plant fresh seed on it, to sweep away cobwebs of hope which entangling our heart have made it sick: in other words to disabuse our minds completely that any of all the old anti-malarial measures tried in this country can eradicate malaria. They have been tried *ad nauseam* by many capable, enthusiastic, and patient medical men and planters, and they have all failed,*² with one exception, that measure of cutting down jungle and draining it when it is causing malaria, Dr. Watson's work. These old measures can only mitigate the havoc, but without decrying the mitigation of this, or any disease, we wish here to have nothing to do with it. We wish to go the whole hog, and pluck out the trouble root, stock, and barrel. Like Mrs. S. Battle no half-measures will please us. Therefore with the exception, referred to above, nothing can matter now except 'piping', and it is to the consideration of various aspects of this subject that we accordingly invite our reader's attention.

* Because of the inherent impossibility to do otherwise in this country, not because the medical men are inept as one anonymous writer in the *Malay Mail* has kindly suggested.

Of these aspects we particularly wish to draw attention to the suggestion which we will put forward that the usually adopted piping scheme should be so modified that the cost will be very considerably reduced and therefore that many who could not now think of the expense would be ready to incur what is needful in this respect. The other aspects of the subject, some of which have not been put forward before, will be treated of with reference to the questions whether 'piping' is the cheapest mode of drainage for agricultural purposes only, whether it is or is likely to be, an effective anti-malarial measure, and whether in the event of its being a success it shall be our sheet-anchor for always.

The planter at least will be glad to know the best or worst which the piping system can afford, he will lend a ready ear to anything which can persuade him he is saving the shareholders' money, he will be apathetic on the question of piping being the cheapest mode of drainage *per se*, he will take a kindly interest in anything good the future portends to have in store; and the discussion below attempts to feed these very human traits in his character.

I. IS PIPING THE CHEAPEST MODE OF DRAINAGE.

It is sometimes contended that piping is cheaper than open drainage because the upkeep of the latter is so costly, and that therefore the piping should be put in if only for agricultural purposes.

This contention seems to us to place the planter 'twixt the devil and the deep sea if he is thinking of piping as an anti-malarial measure, for on his one hand he has the devil luring him on with these seductive promises of saving him much money if he pipes, and on his other he has the deep sea whispering to him all sorts of tragedies past and to come associated with piping.

The devil however must be adjudged out of it, if only because the sagacity of a generation of planters would have soon discovered if his promises had been likely to be fulfilled. But not only this. In other countries pipe-draining for agricultural purposes has not been considered cheaper than open drainage, for otherwise it would have been utilised. And it has not been considered cheaper notwithstanding its ideal characters in every way. The advantage say of a catch-crop of lettuces over the pipes has not apparently been thought worth paying the piper for.

It is not difficult, we think, to find the reasons which have probably guided planters' instinct in this matter. For whether he open-drains or pipe-drains he will have the expense of clearing away the silt deposited by storm water if he wishes his rubber to grow.

on the land, (we have this on good authority) even if we grant that piping will make his ground dry when his silted up open drains would have left it a swamp, so where does the advantage come in, the piping has been to him a super-added expense and he has nothing to shew for it. Of course if no silt comes down into the valley open drains have no disadvantages and piping them is a superadded expense also.

The system is to be regarded as a baby. If we exaggerate like a fond mother the virtues which it does not possess, the other mothers will come along at the baby show and make rude remarks about it. Instead they might say 'Oh what a dear creature..'

II. IS PIPING LIKELY TO BE EFFECTIVE AS AN ANTI-MALARIAL MEASURE?

In this section we will consider the whisperings of the deep sea about certain tragedies, and certain other points which may help us to come to a just conclusion on this subject.

Firstly, what of a certain estate which is said to have completed the piping of an area which extends forty chains everywhere from a 'protected' area, and yet has lately had several cases of fever in the middle of this protected area? The certain estate is in Selangor and the question is being asked by planters as far afield as in Johore, for the news spread like wildfire. Now the answer is that this estate has not finished piping a forty chains radius; twenty-five chains from the protected area we discovered the breeding ground, of *maculatus* (once misnamed *willmori*), not piped, and 22 chains away was a strip of jungle which alone would be enough cause for the trouble, according to Watson's theorem, and that these breeding grounds are near enough to cause trouble is proved by the fact that *maculatus*, *umbrosus*, and *albirostris*, all fever carriers, were found in a bungalow in the protected area. We therefore are in *statu quo ante* as far as this estate is concerned—it proves or disproves nothing except the interesting fact that twenty-five chains is not far enough away from *maculatus* breeding-places to be safe. The piping system is arraigned for hazarding by default the lives of many people entrusted to its care, but the evidence given is not admissible in the trial and we can show, we think, that other evidence similarly breaks down on cross-examination.

Thus it is said that intervening rubber, or a half-way house in the form of a bungalow, may enable mosquitos at the periphery of a piped area to reach the central area by easy stages. Will this be so, for has it enabled them to do so in the Coast district?

There, a distance of forty chains from the source of danger has been sufficient to grant immunity from malaria, whether the intervening space has been occupied by rubber or bungalows or cooly lines.

Then it is said that perhaps wind will drive mosquitos from the periphery of a piped area to the central protected area: this however has not apparently happened in the Coast district, so why should it in the hills? Mosquitos certainly have been known to be driven by the wind 30 miles, in America on the desert, and they may perhaps for all we know be carried sometimes from Penang to Singapore; but this occurrence is not a factor which has had anything to do with the incidence of malaria in Malaya. Thus is there any suspicion that any estate has ever been made unhealthy because mosquitos have been only blown into it—the breeding grounds of the anophelines are always near at hand if there is fever on the estate. Or why should Lipis be healthy and Raub unhealthy if wind transports infective mosquitos up the valleys, or Batu Tiga unhealthy and Klang healthy if wind transports the noxious beasts down the valleys?

Again others object that it is not feasible always to pipe, but Engineers assert that anything can be piped from a whiskey bottle to the Ocean provided they can get a fall, say into one of the canals of Mars.

We therefore believe that the piping system is operable (expense not considered) in every situation where it could be wanted, and that nothing valid as evidence of its inefficiency has been yet established against it, except that 25 chains, as instanced by the estate mentioned, is not far enough to pipe from the protected area.

Let us now consider the following evidence in this question. Is not malaria very 'local' in her operations? Everyone says so at any rate in conversation. It is the general experience. We know too of one estate in Selangor with a whole chain of lines down a valley; they are intersected at one spot by a small side-ravine full of *maculatus* breeding places and on each side of this little ravine the malaria is terribly bad, but as soon as we descend the valley the coolies become less subject to the disease to a tremendous extent (only ten chains away), 25 chains away the coolies health is 'very fair', and 40 chains away the manager has no reason to clouden his manly brow. The experience too of the estates and towns which have commenced piping is encouraging in their general reported improvement of health.

It seems therefore that as an anti-malarial measure success will follow on piping all water say forty chains from a protected area, and none of the warnings uttered seem to be reasonable.

III.

PROPOSAL TO REDUCE THE COST OF PIPING WITHOUT LESSENING
ITS EFFICIENCY.

Now we wish to recommend certain courses which will make piping much less costly than formerly, if it is decided to instal the system, and will bring it within the limits of consideration of many poorer estates who cannot think about it at present by reason of its expense.

The piping of every drop of surface-water must be regarded as a panic-stricken measure, and a needless expense. For is it not true that it is only in collections of water of a very definite character in which anopheline larvæ breed and only some of these anophelines are responsible for carrying fever? This latter fact, if fact it is, seems to be very little appreciated and certainly never acted on. Therefore we suggest that only those collections of water which harbour the DANGEROUS anophelines should be piped, and *not until these anophelines have been found*. It is not even economically safe to say that such or such a place looks suspicious and therefore ought to be piped. We know of a hill-foot swamp at Bukit Merah in North Perak which *looks* certain to be breeding *maculatus*, but that it is not doing so may be taken from the fact that all the inhabitants of the village just at its side are malaria-free. Dr. Watson himself in his book 'Prevention of Malaria in the F. M. S.' inferred that it might not be necessary to pipe streams, perhaps only the 'eye' of the stream need be piped, and Government is proposing to conduct an experiment in draining at Tarentang in which effect will be given to this idea. We only wish to carry the matter to its logical conclusion, and pipe those collections of water which are breeding the cause of the trouble.

We recommend to the notice of the reader what the late Sir Rubert Boyce said '...accurately locate the breeding places of the enemy and thus avoid dissipating energy by attacking useless places.' What is the use of knowing that some mosquitos only cause malaria, if we spend thousands of pounds in eradicating all forms of the tribe. Probably some hardy persons will get up here and say that they wish to be convinced that only some forms of mosquitos carry malaria, but as we know this type of person we will refrain from trying to convince him,—a man convinced against his will, is of the same opinion still—confident that the world's progress will leave him behind until he fades away to nothing on the horizon, crowing to the last on his muck-heap.

Our suggestion therefore is that *only water which is breeding dangerous anophelines should be piped*.

IV. THE FUTURE.

We have now discussed the considerations as they arise at the *present time* in regard to this subject: but what of the future? Is 'piping' always to hold sway in the eradication of malaria, as it seems that it must for the moment? To this question the answer is, 'Yes, until something equally effective but with other greater advantages is discovered'?

But I think it was our old friend Hippocrates who enunciated the maxim that an ideal drug should cure certainly, quickly, and safely—*certe, celeriter, tuto*. Modern Hippocrates think however of the properties of elegance and cheapness. Now if the State Engineer of the old physician's day had been accustomed to lay down pipes in the ravines and rubber plantations of his Grecian home the hippocratic humour would almost certainly have included 'piping', not to mention the whole gamut of preventive medical measures, among those things whose virtues should be those given above—certainty, quickness, safety, elegance, and cheapness. How does 'piping' live up to these virtues? We must admit,—in answer to this,—that we think that it subserves the qualities of certainty, quickness, and safety; we would say that it is as certain as anything could be, the results as quick as the Engineers do the work, and that ulterior safety is not imperilled, but with regard to the other two qualities, elegance and cheapness, it will be said by Scot, Pict, Angle, Celestial, or Malay, that they are absolutely possessed by the system in varying degrees according to his individual conception of these virtues. There can however be no latitude in view when piping relative to other methods is regarded, and so I hope that some more elegant and cheaper way of putting salt on the *jintek-jintek's* tail* than hitting him on the *head* with a hard pipe—a measure which seems just as stupid as an elephant shoving a flea—will be discovered in the future, a measure also infinitely cheaper. Could anything in the eradication of a disease be more ideal than Dr. Watson's prevention of malaria on flat land by cutting down jungle and draining it; a method certain, quick, safe, elegant in a sense, and cheap. And there is no reason why something equally effective apart from piping should not be discovered in the future for the eradication of malaria on the hill-lands. Therefore *Piping* is let us say for the present, not for the future.

CONCLUSION.

We at the outset endeavoured to justify a consideration of 'piping' from various aspects. In detail we hope to have carried complete agreement on this point, and especially when we came

* Mosquito larva.

to suggest the modified scheme of piping so as to reduce the cost. The subject is big, the issues vital, and the workers so few, that there should be no room for prolonged disagreement, unfriendly criticism, or an exhibition of enlarged spleen. Two and two always make four *we* think, but let us listen awhile to the critics who say it makes three, and finish up by saying 'Tiga s'tengah'.

A spectre stalks over the land with ghastly visage and stealthy steps and death-dealing touch. It is the duty of all to all join to lay him, it is no use maiming him merely, and then the brows will un-wrinkle of those whom we wish here to take the opportunity of thanking for their cordial assistance in our work, and for their cheery hospitality.

LIMING.

By B. J. EATON.

The following notes on the application of lime to soil and its beneficial effects have been written at the request of an F. M. S. planter, who suggested that an article on the subject would be of interest to planters in general. An article on this subject by the writer appeared in the Agric. Bulletin, S. S. and F. M. S., Vol. X, No. 9, in September 1911, but the interest taken in manurial problems and the cultivation and amelioration of the soil on estates in this country during the last year is sufficient to warrant the preparation of these notes, which are slightly modified from those mentioned above.

Lime may be considered generally as a secondary or indirect manure, except under special circumstances, as it has a secondary action on the soil, improving its physical, chemical and biological conditions. Although lime as a direct fertilizer may not be essential to the growth of the Para rubber tree, and, in this country magnesium salts in the soil may take its place, it must have an indirect action in liberating other essential plant foods, such as potash and phosphoric acid, rendering nitrogen more available and correcting acidity in peaty soils, lightening the texture of heavy clay soils and improving the non-cohesive properties of sandy soils. To those who have lived in the southern counties of England bordering the coast, and have seen the numerous "chalk pits" which abound and the large dressings of this material which are often applied even today, the "white cliffs of Albion" have a practical as well as a sentimental value.

DEFICIENCY OF LIME IN F. M. S. SOILS.

Analyses of Malayan soils by Barrowcliff, the writer and others have shown that these soils are usually particularly deficient in lime and, in general, the proportion of magnesium oxide to calcium oxide is greater than unity, whereas in most European soils the reverse holds.

Whether magnesia can suitably replace calcium on rubber soils is questionable; for certain crops in other countries a high ratio of magnesia to lime is considered detrimental. An analysis of Hevea latex by Barrowcliff, from trees grown in this country, has shown that magnesium salts are present, but that calcium salts are absent or present only in minute quantities. Whether this is general for latex from Hevea trees in different parts of the country remains to be seen. Seeligmann on the other hand has stated in his book on "Rubber and Gutta Percha" that calcium salts and no magnesium salts were present in Hevea latex examined by him.

I do not think that this has any important bearing on the quality of the latex or resultant rubber, as the action of salts of both of these metals on latex, when added as a coagulant or in quantities insufficient to cause coagulation, is very similar. The contradictory analyses however indicate that the salts are mutually replaceable in latex—depending probably on the nature of the soil in which the trees are grown.

ORIGIN OF LIME.

Lime, in agricultural practice is generally taken to mean Quicklime or "Slaked lime", i. e. Calcium oxide or hydrated oxide of calcium. The former is derived from the harder limestones, such as are found in parts of this country, or from the softer chalk, so prevalent in parts of England, which consists of Calcium carbonate; the quicklime is obtained by "burning" the limestone etc. in kilns, by which the carbon dioxide gas is evolved and lumps of quicklime left behind. The most valuable quicklime for agricultural purposes is derived from limestone and chalk which is comparatively free from magnesium carbonate.

Slaked lime is prepared from quicklime by treating the latter with water, when the lumps disintegrate to a fine powder. For agricultural purposes the "slaking" is usually performed by placing the quicklime in heaps of one or two cwt. in the field and covering with soil, allowing the atmospheric moisture to cause the "slaking". If exposed to the air, in a comparatively dry atmosphere the lime may hydrate slowly and absorb carbonic acid from the air and be reconverted to carbonate, in which form it is less valuable. In

this country however, where the atmosphere is so moist, quicklime may be placed in open heaps and is usually completely slaked by allowing to stand overnight, during which time it probably absorbs very little carbonic acid. The fine powder of "slaked" or hydrated lime can then be easily spread. One ton of limestone produces approximately $\frac{1}{2}$ ton of quicklime, and one ton of the latter produces about $1\frac{1}{3}$ tons of "slaked" lime.

The practice of liming is one of the oldest arts in agriculture and its origin is lost in the realms of antiquity. In former times, very large dressings were applied; the more modern practice of subsoil drainage for heavy soils has resulted in the use of smaller quantities for improving the physical properties of the soil.

It should also be borne in mind, that excessive and prolonged liming eventually exhausts the soil by depleting the food reserves.

ADVANTAGES OF LIMING.

The value of lime as an indirect fertilizer is threefold:—

1. Mechanical:—It improves the texture of heavy clay soils by coalescing or coagulating the fine particles of clay into larger aggregates, allowing better circulation of air and moisture in the soil which are so essential to root development.

It binds together very sandy soils, and, together with the growth of green manures, which should precede the application of the lime, or the mulching of bulky organic fertilizers to conserve moisture, is of considerable value on such soils. This action may appear somewhat paradoxical, but the preparation of cement by mixing sand and slaked lime is well known in building operations.

2. Chemical:—It liberates potash from its insoluble compounds with silica present in the soil and phosphoric acid from iron phosphates, etc.

Lime acts on nitrogenous organic substances and causes the production of ammonia hence it should not be mixed with organic nitrogenous fertilizers or farmyard manure; it also assists in the formation of nitrates, and nitrites which are used directly by plants.

The acidity of peaty and sour soils is corrected by adding lime. The most satisfactory test for acidity in soils is to ascertain whether such soils turn red litmus paper or solution blue; soils which act in this way undoubtedly require liming, even if calcium salts are present.

3. Biological:—The biological and chemical effects produced by liming are closely associated, since the beneficial bacterial flora which is increased and stimulated by liming acts principally

on the nitrogenous substances present in the soil and converts them into easily assimilable forms. Nitrogen is usually present in an organic form, and, before it can be utilised by the plant is reduced to ammonia and must be subsequently oxidized to nitrites and nitrates which can take place satisfactorily only in the presence of a free base, such as lime, so that the acid formed is neutralized.

Recent experiments by Russell and Hutchinson at the Rothamsted Experimental Station, England on the partial sterilization of soils by heat, and by organic solvents such as toluol, carbon bisulphide, etc., have been extended to a study of the effects of lime, and the results indicate that lime, if added in sufficient quantity, also causes partial sterilization, destroying the harmful protozoa and subsequently causing an increase of the bacterial flora essential to plant growth.

Lime is also effective in destroying mycelia of *Fomes semitostus* and other fungal mycelia present in the soil which may be injurious to cultivated plants.

METHOD OF APPLICATION OF LIME.

Lime, as stated before, is best applied by "slaking" quicklime in heaps in the field, natural slaking by atmospheric moisture being preferable, as a finer powder is obtained in this way than when water is added in large quantities at a time.

A dressing of $\frac{1}{4}$ to $\frac{1}{2}$ ton of quicklime per acre may be used on ordinary soils of good texture in this country and larger dressings of 1 to 2 tons on very peaty and clayey soils. Unfortunately lime appears to be somewhat costly in the F. M. S. (one dollar per pikul or about \$17.00 per ton with transport in addition) and in liming, as in other manurial or cultivation experiments, control plots should be maintained, and observations as to growth of the tree or yield of latex or both should be carefully made on the untreated and treated plots, in order to ascertain whether the effects are commensurate with the cost.

Experiments are being carried on by the Department to ascertain whether "ground" limestone, which is comparatively cheap (about \$1.60 per cubic yard weighing $\frac{7}{8}$ ton) can be substituted for quicklime or slaked lime on the estates in this country, especially on peaty soils.

In applying lime, the surface should be forked over, as otherwise if the soil surface is baked and hard, the lime may be washed away by a heavy rain. Lime should always be applied several months before the application of other manures or fertilizers and in the case of trees of 3 or 4 years or older may be broadcasted between

the rows; in the case of young clearings shallow trenches about 3 or 4 inches deep at a radius of two to six feet should be dug round the tree, according to the age of the tree and development of lateral roots and the lime applied in these trenches.

CONCLUDING REMARKS.

I should like in closing this article, to impress on all planters and other investigators the necessity of accurate control and observation in all field experiments in liming or manuring or other agricultural operations. Unless large badly yielding areas are being treated on the advice of scientific officers, where, by means of investigation, the cause has been ascertained and the remedy is known, all field work should be carried out on plots of at least 1 or 2 acres with control plots. In the case of rubber trees, if the trees are being tapped, observations as to yield should be made for two or three months on each plot before any treatment is commenced, and, if there are differences, the control or blank plot should be the one producing the better yield so that any increase of yield on the treated plots is then almost undoubtedly caused by the treatment. Similarly, where girth is used as the method of measuring effects of treatment, the control plot should contain trees having the largest average girth, if any difference exists between the various plots. These differences, either of yield or girth or other measure, should not be large, otherwise the comparison would be unfair.

THE DRAFT WATER HYACINTH EXTERMINATION ENACTMENT IN KEDAH.

In the *Agricultural Bulletin* of the Federated Malay States, Vol. I No. 6, page 228 is a short article by Bancroft on the water hyacinth (*Eichhornia crassipes*) which gives some account of its appearance and distribution and makes mention of the harm that it does in choking up rivers and water courses generally. This plant occurs in some quantity in certain parts of the Malay Peninsula and in many places threatens to inflict a considerable amount of damage by choking up drainage canals. In Kedah, according to information received from the British Adviser, the spread of the plant has been so vigorous that it now threatens to cause very serious harm to the drainage system of the rice growing areas; so much is this the case that it is proposed to introduce legislation in that State for the purpose of eradicating it.

According to the statements made in the Objects and Reasons of the proposed Enactment the plant was introduced into Kedah some five years ago by—it is said—some Chinese who found that the leaves afforded shelter, whilst the roots supplied food to the fish in the “fish-ponds”. From the “fish-ponds” the plant has spread into the canals and has badly infected the Sanglang and Sungei Daun canals which are in consequence receiving special attention from the canal officers.

According to the terms of the proposed Enactment it will be absolutely prohibited for any person to permit the water hyacinth to grow in any place upon his land, and it will be the duty of every penghulu of a mukim to serve a written notice upon any person in whose land he sees this plant growing requiring that person to destroy the plants within 7 days from the date of the notice. If any person fails to comply with the notice he will be summoned before the Court and on conviction will be punished by a fine of not less than \$5.00 and not more than \$50.00 at the discretion of the Magistrate. Half the fine will go to the Penghulu. Further, it will be the condition of the lease of every Government “fish-pond” that no water hyacinth plant be allowed to grow in it, and if any plant is found growing in it, the lease will be immediately cancelled.

In certain parts of the Federated Malay States serious harm is being caused to drainage systems in the same manner as in Kedah and it will probably be necessary to deal with this plant as a pest in the sense of the new Pests Enactment in all such districts. The plant can easily be destroyed by removing it from the water, allowing it to dry on the bank and then burning it in heaps. It would be necessary to re-examine the cleared drains or canals after an interval of a few weeks to make certain that no new plants were growing from seeds or from small offsets which had escaped attention at the first clearing. Moreover, much additional trouble and expense could probably be avoided at the second examination, if the first cleaning up were carried out as far as possible before the plants have had time to flower, and if the work were done thoroughly and completely. The plant spreads very rapidly and any small portion of it left in the water or on the sides of the canal or pond is capable of annulling in a short space of time the beneficial effect of the work done. As the plant can spread from ponds to canals, it would be necessary to eradicate it from all pieces of water of whatever nature within the district in which it was to be destroyed.

F. W. S.

EXPERIMENTS AT SUNGEI TENGAH, SARAWAK.

Comparison of Daily versus Alternate Day Tapping.

We have pleasure in publishing the following notes on some tapping experiments by Mr. E. Hose. The results show that under the conditions of the experiment, alternate and every day tapping gave very similar yields for approximately equal amounts of bark removed. This result is not the same as that obtained in the experiments carried on in the Kuala Lumpur Experimental Plantation (see *Agri. Bull.*, Vol. I, pp. 60, 296) where every day has each time given increased yields over alternate day tapping.

We should have preferred to have had experiments on trees with a more uniform previous history, and for them to have been carried out for a longer period. But they do indicate the possibility of soil and climatic conditions affecting not only the yield, but also the best methods of obtaining the best yield, and show that every planter should be an experimenter. Planters in the F. M. S. will not need to be reminded that the Department of Agriculture is always ready to assist them in planning and carrying out experiments.

Ed. *Agri. Bulletin.*

Trees $4\frac{3}{4}$ years old, planted $17' \times 17'$, each division consisting of 200 trees having as nearly as possible an equal average girth at 3 feet from the ground (about $17''$); no abnormal trees were included.

The trees had been previously tapped daily on their West face for various length of time, the longest for one year, others for 9, 6 and a few 3 months. They were originally opened with a basal "V", and where large enough, i.e. having a girth of $16''$ or over, top cuts were put on, on the left quarter up to a height of 5 feet.

For the experiment all trees have been tapped on the East side.

Division 1. Was marked off with a basal "V" at 20" from the ground, this to last $1\frac{1}{2}$ years daily tapping.

Division 2. Was marked off with a basal "V" 12" from the ground and a second "V" above this at 21" from the ground, (i.e. 9" between the cuts) this to last $1\frac{1}{2}$ years alternate day tapping.

Tappers. Experienced Javanese, who were interchanged every 28 days that figures were recorded.

No second quality latex is shewn as the latex brought in is coagulated in the buckets without straining etc.

12% loss in weight on wet rubber has been allowed.

The period over which the figures have been collected, spreads from November 1st. 1912 to June 27th. 1913, which includes our wettest months; the actual rainfall was

1912.	November	15.67 inches.
	December	27.26 "

1913. January	38.61 inches.
February	36.17 "
March	16.16 "
April	13.87 "
May	15.35 "
June	6.31 "

Our average per year is 150", more or less, during January and February some of the trees were often flooded, sometimes for 2 or 3 days together.

Soil. Stiff clay subsoil, with moderately friable surface.

Wintering. By the 15th of June, half the trees were losing their leaves.

Tapping. The common straight $\frac{3}{8}$ " gouge was used and an average of 30 cuts to the inch was obtained.

Figures Recorded. The actual number of days on which figures were recorded was as follows:—

No. 1. Division	168 days.
" 2. "	82 "

and an allowance should thus be added to No. 2 figures to compensate for the 2 days short.

The heavy rise in No. 1 Latex during the 5th period may be accounted for by careless tapping resulting in cambium wounds. The work otherwise has been good.

Only one spout is used on No. 2 Division placed 6 inches below the bottom "V".

THE ACTUAL FIGURES OBTAINED ARE:—

		Division 1.	Division 2.
No. 1. Latex.	1st 28 days.	232.75	203.50
	2nd "	350.50	283.25
	3rd "	446.75	480.75
	4th "	403.75	601.
	5th "	750.75	585.25
	6th "	492.25	521.
		2,676.75	2,674.75
Picked Scrap.	1st 28 days.	44.	48.75
	2nd "	47.80	50.72
	3rd "	51.	46.25
	4th "	48.50	77.50
	5th "	34.75	50.50
	6th "	30.	29.50
		256.05	303.22

Bark Scrap.	1st 28 days.	...	66.	58.75
	2nd	..	66.75	58.75
	3rd	..	61.	71.
	4th	..	65.75	70.50
	5th	..	68.	74.25
	6th	..	61.	79.50
			388.50	412.75
Grand Total Wet ozs.	..	..	3,321.30	3,390.72
Less 12% L/W.	..	..	398.55	406.88
Dry Rubber from 200 trees	..	..	2,922.75	2,983.84

July 24th, 1913.

E. HOSE.

THE LOQUAT.

The Loquat or Japanese Medler, *Eriobotrya japonica*, Lindl., is a native of Japan and China and belongs to the Natural Order Rosaceae. It forms a handsome tree of medium size, and produces small oval fruits of a sweet and delicate flavour. The leaves are large, thick in texture, glabrous on the upper surface, the under covered with a soft white down or tomentum. Flowers are produced on the extremities of the twigs in short pendulous racemes and are white; the peduncle and pedicels also covered with white tomentum. It thrives in most warm countries, and is largely cultivated in France, where quantities of fruits are gathered yearly and sold for dessert. In the south of England it is cultivated as a flowering shrub, usually on south walls; it seldom fruits on account of the late period of planting. At the Tea Gardens, Taijing Hills, altitude two thousand feet, it has become established and promises well. The plants, five in number, from three to six feet high, have already produced several fruits and with good cultivation should prove a useful asset to the scanty collection of possible fruits for Hill stations in the Federated Malay States.

W. L. WOOD.

DEPARTMENT NOTE.

Mr. N. W. Barrit, Economic Botanist, Department of Agriculture, F. M. S., resigned his appointment on August 9th, 1913, owing to ill health.

FEDERATED MALAY STATES.

Comparative Statement of Cultivated Rubber Exported, with Value and Duty Collected Thereon, during the Years 1913 and 1912.

Places of Destination.	Exported during July, 1913.	Previously.	Total export during the year.	Export during similar period of previous year.	Increase.	Decrease.	Value of rubber, 1913, to date.	Duty collected, 1913, to date.
	Tons.	Tons.	Tons.	Tons.	Tons	Tons.	\$	\$ c.
Straits Settlements ...	357.88	4,684.75	5,042.63	3,284.51	1,758.12	...	15,410,004	383,487.33
United Kingdom ...	1,175.74	4,895.81	6,071.55	3,981.25	2,090.30	...	18,160,604	454,015.10
Continent of Europe ...	181.94	609.63	791.57	574.33	217.24	...	2,369,021	59,225.52
Ceylon ...	65.78	293.17	358.95	220.42	138.53	...	1,091,808	27,295.20
America ...	...	...	...	10.08	...	10.08	...	...
Other Countries ...	...	...	...	...	...	...	...	...
Total ...	1,781.34	10,483.36	12,264.70	8,070.59	4,204.19	10.08	37,031,437	924,023.15

KUALA LUMPUR,
6th August, 1913.

W. J. P. HUME,
Commissioner, Trade and Customs, F.M.S.

Abstract of Meteorological Readings in the various Districts of Malaya for the Month of July, 1913.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	TEMPERATURE.				HYGROMETER.				Prevailing Direction of Winds	Total Rainfall.	Greatest Rainfall during 24 hours.
		Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Khota Bahru	143.	82.2	90.93	73.64	17.29	78.	874	75.2	78%	S. W.	8.96	.92
Malacca, Durian Daun Hos.	150.	82.3	87.3	72.2	15.1	79.3	965	...	87	S.	4.46	1.75
N. Sembilan, Dist. Hospital	...	78.9	87.1	70.9	16.2	75.4	820	73.	82	...	7.03	1.60
Seremban	147.8	81.	...	...	...	76.8	842	74.	79	...	1.55	0.45
Dist. Hos. K. Pilah	151.6	80.2	88.4	73.3	15.1	76.1	821	73.2	79	...	4.40	1.35
" Tampin	157.5	81.5	87.4	73.7	13.7	77.4	858	74.6	79	...	7.94	2.49
" P. Dickson	155.6	82.7	89.3	69.	20.3	75.3	...	...	...	...	2.67	0.95
" K. Lipis	140.2	84.15	98.5	73.6	14.9	77.5	871	74.2	78	...	4.58	1.29
Pahang, Penang.	29.789	82.15	94.	72.	22.	77.96	874	...	75	...	3.29	1.39
Perak, Taiping	108.	82.25	92.	70.	22.	76.75	846	...	77	...	1.65	.37
" Ipoh	...	82.93	91.	69.	22.	79.53	963	...	87	...	5.52	1.10
" T. Anson	...	82.02	92	72.	20.	77.25	872	...	81	...	3.24	.89
" P. Buntar	...	...	...	...	...	...	...	...	...	...	4.23	1.35
" The Cottage	...	...	...	...	...	...	...	...	...	...	...	...
Selangor, General Hospital	...	...	...	...	...	...	...	...	...	...	...	...
Kuala Lumpur	146.	81.6	88.5	73.8	14.7	77.9	.888	75.6	82	...	2.63	.70
Dist. Hos. Klang	...	81.5	88.0	73.5	14.5	75.7	...	...	...	...	4.32	.97
" K. Selangor	...	...	87.6	70.	17.6	...	...	...	...	...	6.26	2.54
" Rawang	...	...	91.9	72.2	19.7	...	...	...	...	...	2.59	1.07
Singapore, Kandang Kerbau Observatory	29.884	83.2	91.4	72.	19.4	77.8	.882	...	78	S. E.	4.58	2.07